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Operating Instructions UFR1001E

updated: 121015 Fz
from Firmware: 0-03

- NA-protection according to VDE-AR-N 4105, in-plant power generators on the low voltage grid
- For use in in-plant power generators on the medium voltage grid according to BDEW
- With selectable vector shift detection

New, Firmware 0-03:
- Standby mode
- Optimized for generator operation
- Automatic restarts on feedback error

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1. Application and brief description

The UFR1001E system-disconnection relay monitors voltage and frequency in three-phase current networks. In complies with the conditions for centralized NA-protection according to VDE-AR-N 4105 in in-plant power generators >30kVA, for feeding into the low voltage grid and the BDEW Directive for feeding into the medium voltage grid. When using with generators, the evaluation of feedback contacts for the period of a shut-down and during the synchronization can be suppressed.
The device has two channels which makes it more fail-safe. Input circuitry, evaluation and output relay are provided in duplicate. Two processors monitor each other mutually. Feedback contacts are used to monitor the functioning of both output relays and the section switch. During an alarm both channels shut down, the cause is displayed and it is reported through transistor outputs.

2. Summary of the functions

Applications include monitoring the network in generating plants such as solar and wind turbine generator systems along with mains protection in combined heat and power plants, also with synchronous generators (Vector surge).
The device complies with the requirements of the public utility power providers for conventional protection in low and medium voltage systems >30 kVA.

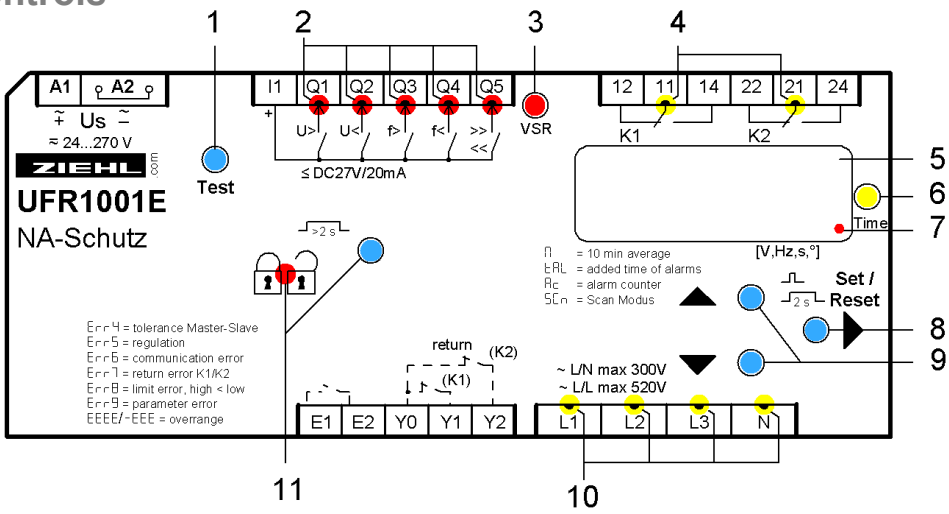
- Under and overvoltage monitoring 40…520 V
- Measurement against N and/or phase-phase
- Under and overfrequency monitoring 45…65 Hz
- Monitoring the voltage quality (10 minute average value)
- Vector-surge monitoring 2…20° connectible
- Fail-safe, with monitoring of the connected section switch (can be switched off), 2 automatic restarts on error
- Passive autonomous system detection in accordance with Chapter 6.5.3 and Appendix D2
- Supports the mains synchronization when using generators
- Self-test
- Response time adjustable 0.05 … 130.0 s, individual setting for each limit
- Reset time adjustable 0 … 999 s, individual setting for each limit
- Reset time 5s at limit violation < 3s
- Presetting per VDE-AR-N 4105
- Alarm counter for 100 alarms (with trip value, cause and rel. time stamp)
- Record of the cumulative time of alarms
- Standby input with counter and time memory
- Test button, simulation function, measurement of the shut-down times
- LEDs for alarm signals, measurement value allocation and relay status
- Sealing facility and code protection for settings, values can also be read in the sealed state
- Simple commissioning and programming through 4 basic programs with preset limits
- Message outputs for general alarm and for forwarding the cause of switching to the upstream controller (transistor, max. DC 27 V, 20 mA)

<u>Medium voltage</u>:

- Per 2x2 limits for voltage and frequency: U<<, U<, U>, U>>, F<<, F<, F>, F>>
- Hysteresis, response and reset value individually adjustable

- Control voltage AC/DC 24-270 V
- Distributor housing V6, 6 TE 105 mm wide, front-to-back size 55 mm

3. Display and controls



1 Test button

Press briefly	Output relays de-energize immediately. If Y1+Y2 are connected and the feedback signal is activated, the tripping time is displayed until the next time a button is pressed

2 LEDs frequency / voltage limit value undercut / exceeded (red)

On, AL or AL 1	Limit value undercut / exceeded
FLASHES, AL or AL 1	Reset delay doF counting down

3 LED vector surge (VSR, red)

ON, AL	Threshold value for vector shift exceeded
FLASHES, AL	Reset delay doF counting down

4 LEDs relay status (yellow)

OFF	Relay is released
ON	Relay operating

5 Digital display 4-digits (red)

Depending on program, display of current voltage, frequency, vector shift, average value
Displays the alarm signals, e.g. AL , AL 1
Displays the errors with error code e.g. Err9

6 LED Time (yellow)

ON	A time is displayed

7 Last decimal point (red)

OFF	Display mode
Illuminated	Menu mode
Flashes	Configuration mode

8 Set/Reset key ▶ (in display mode, normal state)

Press briefly	Display of next measured value / alarm counter
Press for > 2 s	Reset, quit error messages
Press for > 4 s	Displays the program, e.g. Pr 1
Press for > 10 s	Displays the software version, e.g. 0-00

9 Up / Down key ▲▼ (in display mode, normal state)

Press briefly	Change to the menu mode, display of alarm memory (Down) / cumulative time of alarms, standby counter, standby time (Up), pushing Set button for ≥ 2 s resets the stored values
Press for > 2 s	Display of MAX (Up) / MIN (Down) - measured values, additional pushing of Set button for ≥ 2 s deletes the stored values

10 LEDs measurement allocation (yellow)

LEDs	Measured value
Lx and N ON	Voltage value (L1 against N, L2 against N, L3 against N)
Lx and Ly ON	Voltage value (L1 against L2, L2 against L3, L1 against L3)
Lx FLASHING quickly	Vector surge (L1, L2, L3)
L1 FLASHING	Frequency

11 **Sealable button + LED**

Press for > 2 s	Lock / Unlock
LED red	Settings and simulation mode are locked, While attempting to set, `Loc` is displayed for 3s
LED green	Setting and simulation enabled

4. Detailed description

4.1 Description of the connections

Connection	Description
A1 and A2	Rated control supply voltage Us, see Technical Data
11, 12, 14; 21, 22, 24	Relay K1 and K2
E1 – E2 Enable – Input	Volt-free contact
	`uSr .` → `oFF.` , no function
	`uSr .` → `on.` , E1-E2 closed: Vector shift active but not evaluated, monitoring of feedback contacts off for use with generator (mains synchronization)
	`uSr .` → `StbY.` , E1-E2 closed: K1 and K2 off (standby), vector shift off
	`uSr .` → `Y 1Y2.` , E1-E2 closed: Feedback contacts no evaluated, vector shift off, when using with generator (mains synchronization)
Y0, Y1, Y2 Inputs, feedback contacts	Volt-free n/o or n/c contact, self-learning when switching on
	Set value > turn-on time section switch under `rEL .` → `trEL.` / can switch-off if not connected or if external devices/switches can activate the section switch (`oFF .`)
I1	Supply voltage for digital outputs, max. 27 V DC
Q1…Q4	Digital output over-/undervoltage/-frequency
Q5	Digital output error, in Pr 3-6 additionally the 2nd threshold value
L1, L2, L3, N	Phase L1, L2, L3 and neutral conductor

4.2 Functional characteristics

Functional characteristics	Explanation
VSR display value	The highest measured value is always displayed. The display value is reset to 0 by deleting the max. value and when resetting into the go (good) state.
Delay Enable On time	Runs down when starting the unit and after opening the enable input; during this time there is no evaluation of the vector shift
Reset time	When a reset time `doF` is running, it is always counted down in the display (shortest one first)
Reset	Use the Reset key or interrupt the control voltage for > 2 s (comply with reset delay)
Display mode `Scn`	After the last measurement it switches into the scan mode; this is indicated by the display `Scn` . All measurements will now be displayed cyclically for the time set in `di t` .
MIN / MAX values	All min and max values are saved zero-voltage maintained (non-volatile).
Tripping time (only with feedback contacts connected)	Connecting the feedback contacts enables measuring the shut-down time. After a tripping time with the test button it is displayed until a button is pressed again with a resolution of up to 1ms. Total shut-down time = Tripping time + Response time `dAL.`

	After a shut-down in the simulation mode the total shut-down time is displayed until the button is pressed again) The longer time of both channels is always displayed.
Alarm counter	The unit saves max 100 alarms (cause, measurement value, at operating time). The LEDs indicate the cause; the tripping value that led to the alarm each stands in the 7-segment display. Alternately the time difference, current operating time – tripping operating time is displayed. (how long ago the alarm triggered)
Cumulative alarm time tAL .	The cumulative alarm time TAL indicates how long the relay was switched off due to an alarm. It is recorded with a resolution of 1 minute and only when the control voltage is applied. Query: In the display mode ▶ button to Ac . is displayed. 1x ▲ button = Cumulative alarm time tAL .
Standby mode uSr . → StbY.	If E1-E2 are closed (e.g., by ripple control receiver, timer, dimmer), Relays K1 and K2 are switched off. The number and duration of the shut-downs is recorded. Query: In the display mode ▶ button to Ac . is displayed. 2x ▲ button = Standby counter StbY. 1x ▲ button = Standby time StbY.
Standby mode uSr . → Y 192.	If E1-E2 are closed, the evaluation of the feedback contacts is suppressed. That means when using generators, a section switch can be used for mains synchronization.
Automatic restart attempts	If there is an error by the feedback contacts Err1, 2 restart attempts are automatically performed in an interval of 10s. False triggering by undervoltage trips (e.g. during a thunderstorm) do not lead to permanent shut-down.

5. Important information

A marked switch and a protective device must be provided in the supply line in the vicinity of the device (easily accessible) as a disconnecting element (rated current ≤ 6A).

Flawless and safe operation of such a device requires proper transport and storage, professional instillation and later commissioning along with operation as intended.
Only persons who are familiar with the installation, commissioning and operation of the device and who are correspondingly qualified for their job are permitted to work on the device. They must comply with the contents of the operating manual, the instructions attached to the device and the pertinent safety regulations for the erection and operation of electrical equipment.
The devices are built and certified in accordance with EN 60255 and leave the factory in a safe and technically flawless condition. To maintain this condition they must comply with the safety regulations marked in the operating manual with the headline "Caution". Failure to follow the safety regulations can lead to death, bodily injury or property damage to the device itself and to other devices and equipment.
If the information contained in the operating instructions/operating manual are not sufficient, please contact us directly or contact your responsible agency or representative.
Instead of the industrial norms and stipulations stated in the operating manual and applicable in Europe you must comply with the valid and applicable regulations in the country of utilisation if the device is used outside of the area of application.

WARNING

Hazards electrical voltage!
Can lead to an electric shock and burns.
Disconnect and de-energize before working on the system and the device.

6. Assembly

The device can be mounted:

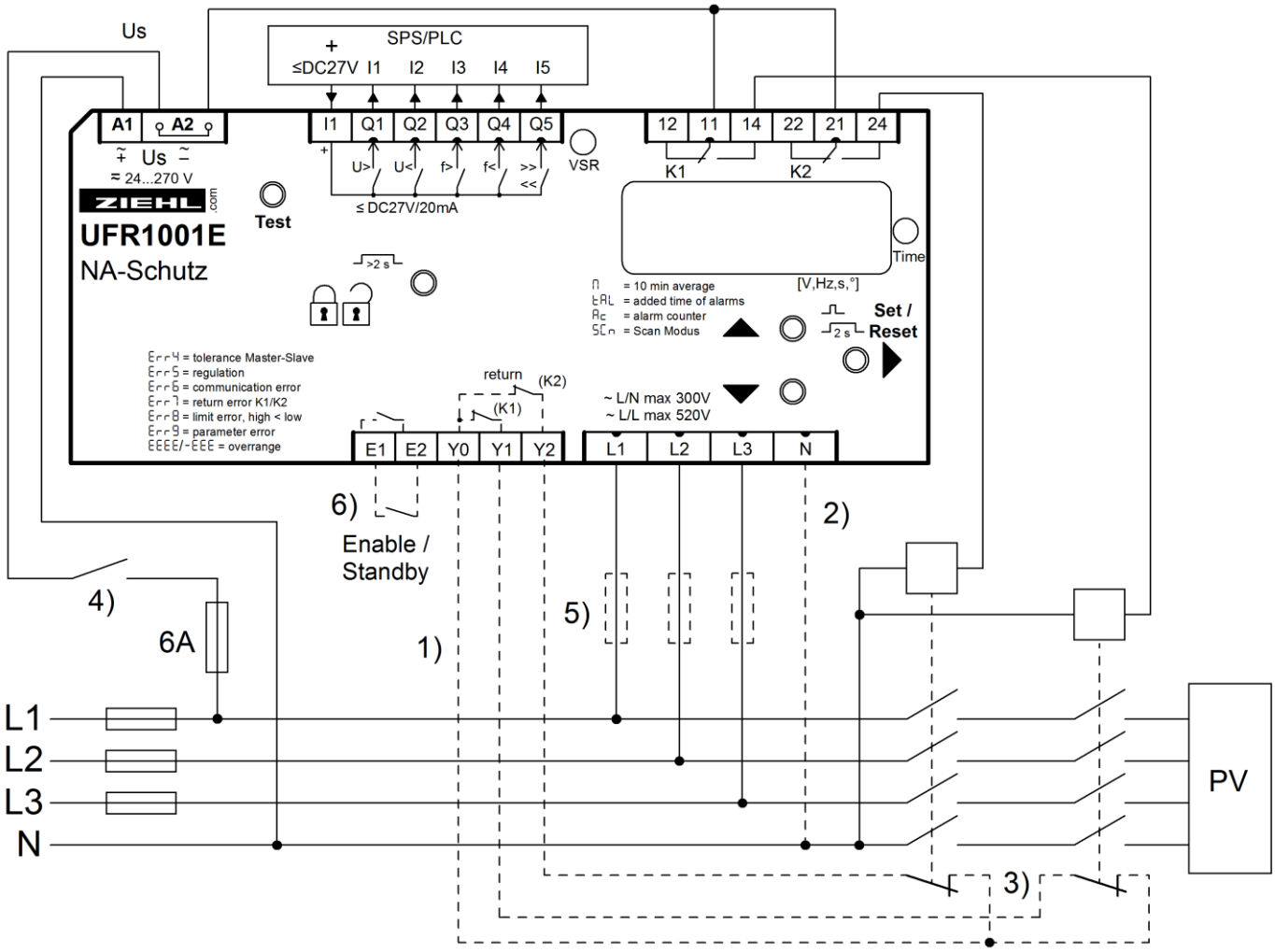
- Distribution panel or control panel on 35 mm rail according to EN 60715

Comply with the maximum permissible temperature when installing in a switch cabinet. Ensure sufficient clearance to other devices or heat sources. If cooling is inhibited, e.g., through close proximity to devices with increased surface temperature or interference with the cooling-air current, the permissible ambient temperature is decreased.

Caution!
Before you apply mains voltage to the device, make sure that the permissible control voltage **Us** on the side rating plate matches the mains voltage connected to the device!

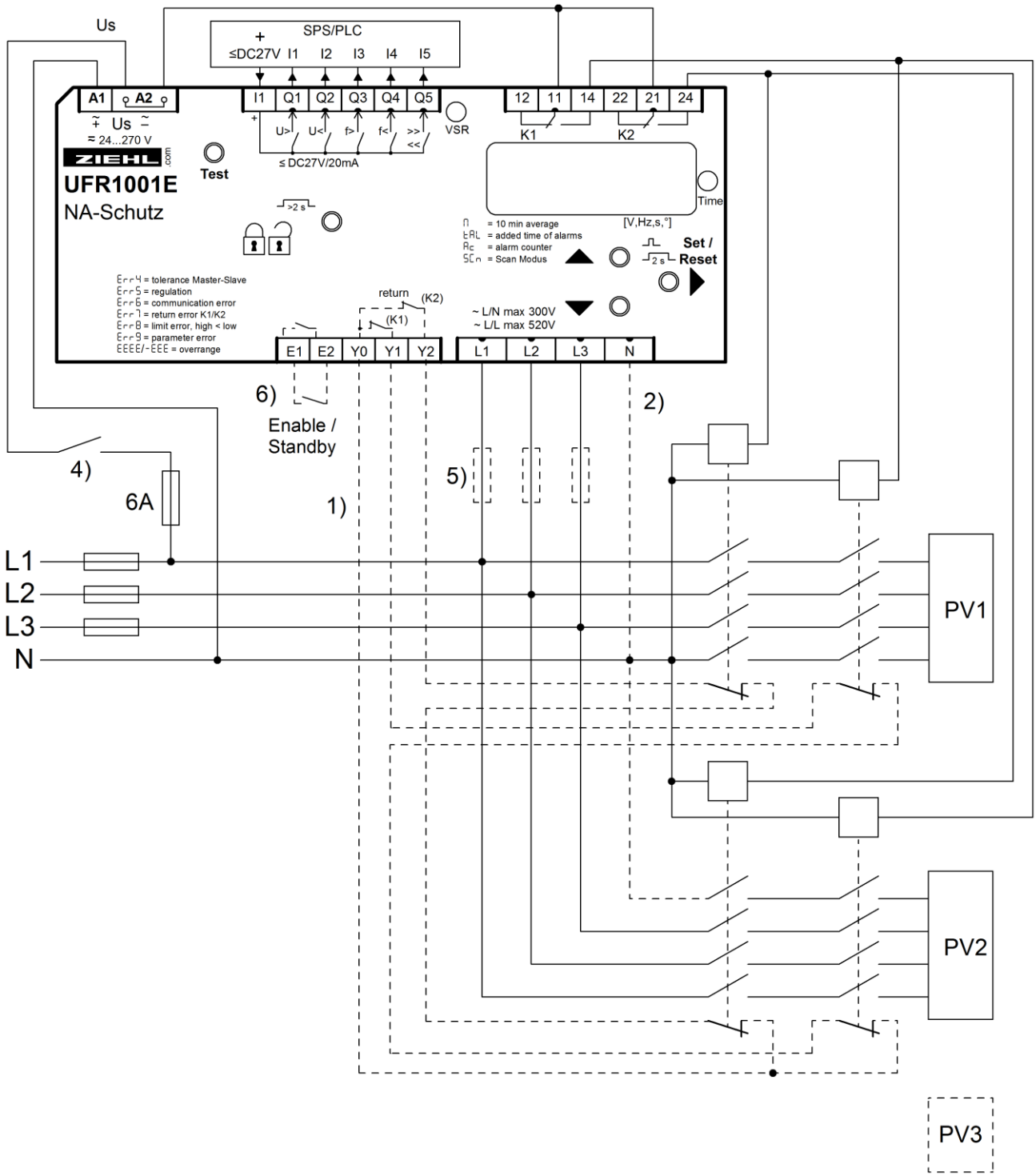
7. Connection diagrams

7.1 1x PV, 2x section switch (= Standard low voltage)



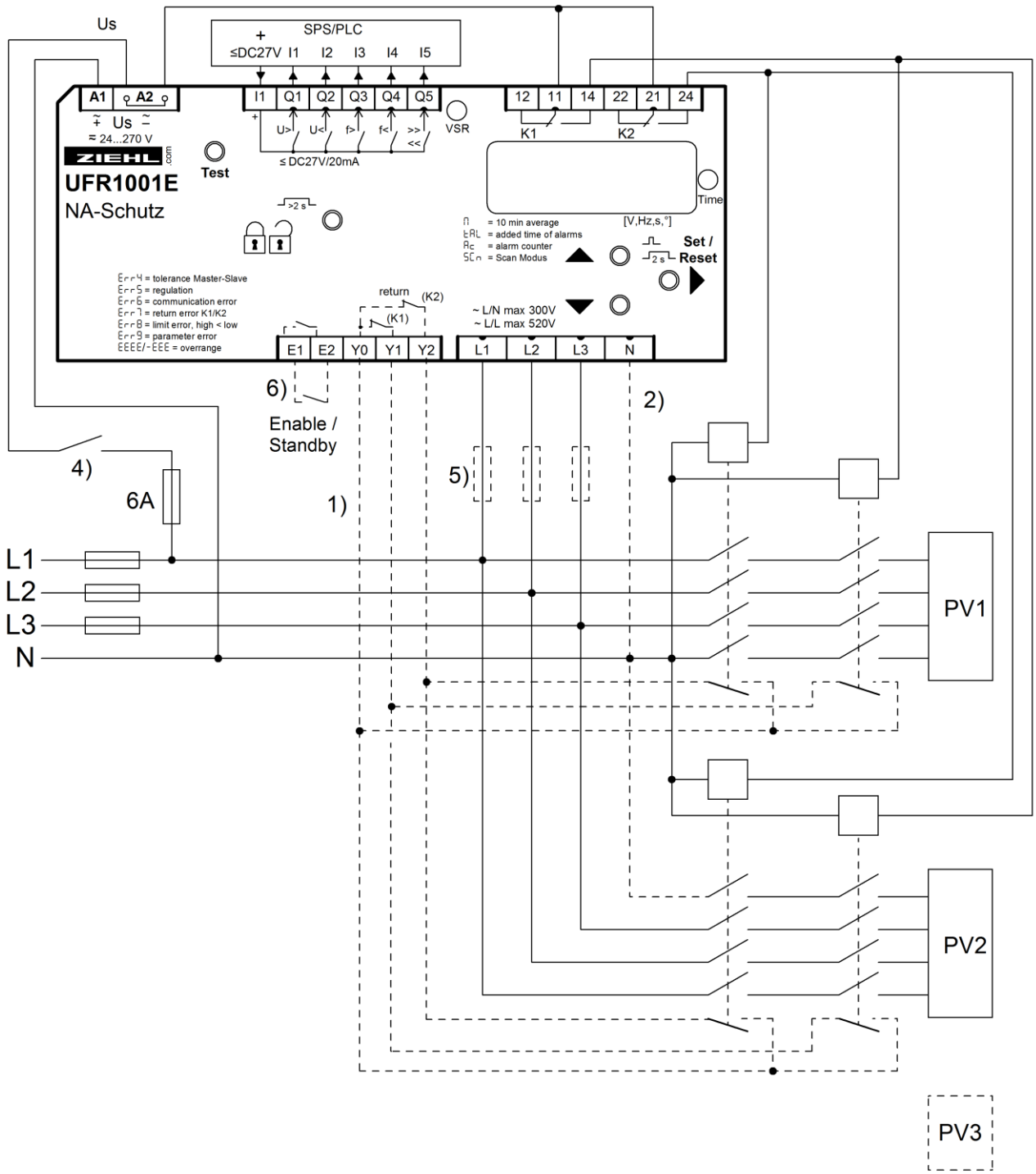
1) Feedback contacts not connected set rEL . → trEL. → oFF.
2) N connected set Pr 1 , Pr 3 or Pr 5
3) Nc- or no-contacts can be connected, automatic detection when switching on
4) Switch off the plant without recording an alarm, e.g. with output contact of a ripple control receiver
5) Fuses only when line protection necessary, e.g. 3x16A
6) Contact closed suppresses evaluation of feedback contacts and vector shift (usr . → on.) suppresses feedback contacts (usr . → Y 142.) or switches device into standby (usr . → StbY. = default setting) e.g. through ripple control receiver or timer

7.2 Multiple PV with section switch and with a series-switched NC's as feedback contacts (expanded inventory plant)



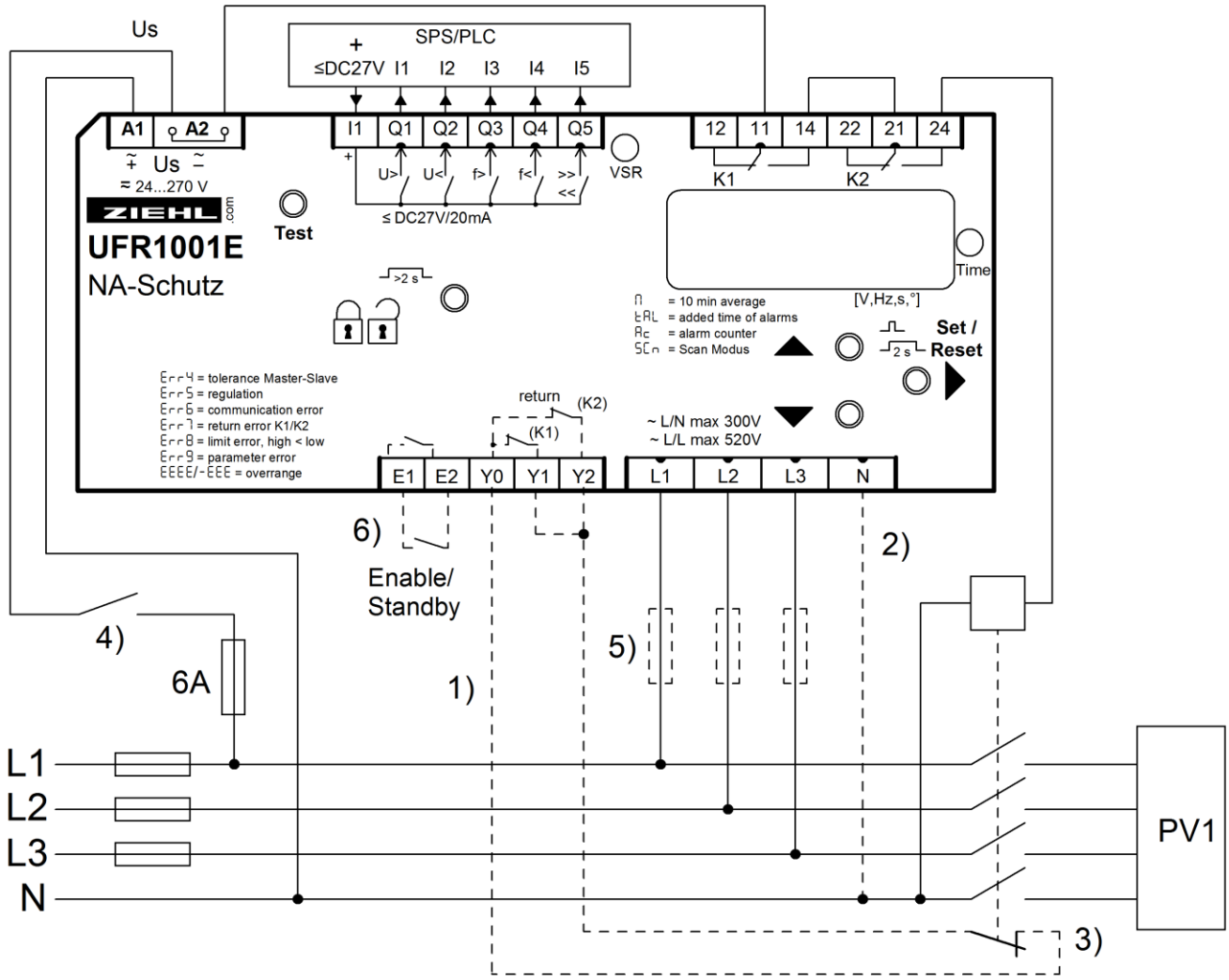
1) Contactor feedback contacts not connected set rEL. → trEL. → oFF.
2) N connected set Pr 1 , Pr 3 or Pr 5
4) Switch off the plant without recording an alarm, e.g. with output contact of a ripple control receiver
5) Fuses only when line protection necessary, e.g. 3x16A
6) Contact closed suppresses evaluation of feedback contacts and vector shift (usr. → on.) suppresses feedback contacts (usr. → Y192.) or switches device into standby (usr. → StbY. = default setting) e.g. through ripple control receiver or timer

7.3 Multiple PV with section switch and with a parallel-switched closing contacts as feedback contacts (expanded inventory plant)



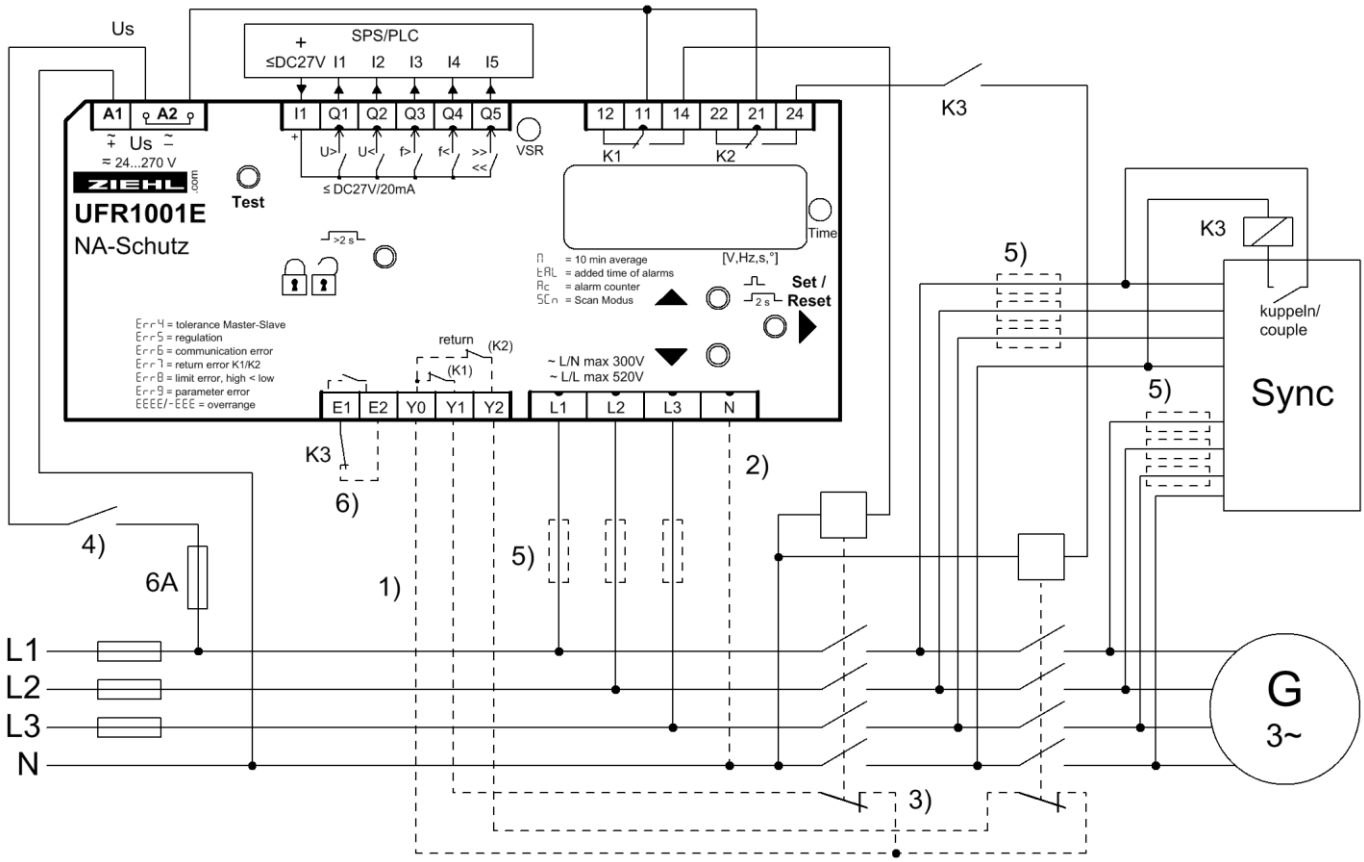
1) Feedback contacts not connected set `rEL .` → `trEL.` → `oFF.`
2) N connected set `Pr 1` ,r `Pr 3` or `Pr 5`
4) Switch off the plant without recording an alarm, e.g. with output contact of a ripple control receiver
5) Fuses only when line protection necessary, e.g. 3x16A
6) Contact closed suppresses evaluation of feedback contacts and vector shift (`uSr .` → `on.`) suppresses feedback contacts (`uSr .` → `Y 192.`) or switches device into standby (`uSr .` → `StbY.` = default setting) e.g. through ripple control receiver or timer

7.4 1x PV, 1x section switch with nc/normally closed contacts (medium voltage)



1) Feedback contacts not connected set rEL . → trEL. → oFF.
2) N connected set Pr 1 , Pr 3 or Pr 5
3) Nc- or no-contacts can be connected, automatic detection when switching on
4) Switch off the plant without recording an alarm, e.g. with output contact of a ripple control receiver
5) Fuses only when line protection necessary, e.g. 3x16A
6) Contact closed suppresses evaluation of feedback contacts and vector shift (uSr . → on.) suppresses feedback contacts (uSr . → Y 192.) or switches device into standby (uSr . → StbY. = default setting) e.g. through ripple control receiver or timer

7.5 Generator operation, suppression of the feedback contacts (with external shut-down and mains synchronization)



1) Feedback contacts not connected set rEL . → trEL. → oFF.
2) N connected set Pr 1 , Pr 3 or Pr 5
3) Nc- or no-contacts can be connected, automatic detection when switching on
4) Switch off the plant without recording an alarm, e.g. with output contact of a ripple control receiver
5) Fuses only when line protection necessary, e.g. 3x16A
6) Contact closed suppresses evaluation of feedback contacts and vector shift (uSr . → on.) suppresses feedback contacts (uSr . → Y 192.) or switches device into standby (uSr . → StbY. = default setting) e.g. through ripple control receiver or timer

8. Commissioning

8.1 Program setup

The suitable program must be set on the UFR1001E in accordance with the application. If the UFR1001E is sealed/locked (red LED illuminated), the sealing has to be deactivated first.

Pr	Connection	Threshold values	Voltage
*1	3 AC with N	Low voltage 1x overvoltage, 1x undervoltage 1x overfrequency, 1x underfrequency 10 min average value, 1x vector shift	230 V
2	3 AC without N		400 V
3	3 AC with N	Medium voltage 2x overvoltage, 2x undervoltage 2x overfrequency, 2x underfrequency 10min mean value, 1x vector shift	57.7 V
4	3 AC without N		100 V
5	3 AC with N		230 V
6	3 AC without N		400 V

* default setting

Adjustment process:
If present, remove seal (only authorised person)

- Apply control supply voltage at A1-A2
- Slightly lift the key cover and turn 180°
- Actuate the small blue button by firmly pressing the button cover (LED starts flashing) until the green LED is illuminated.

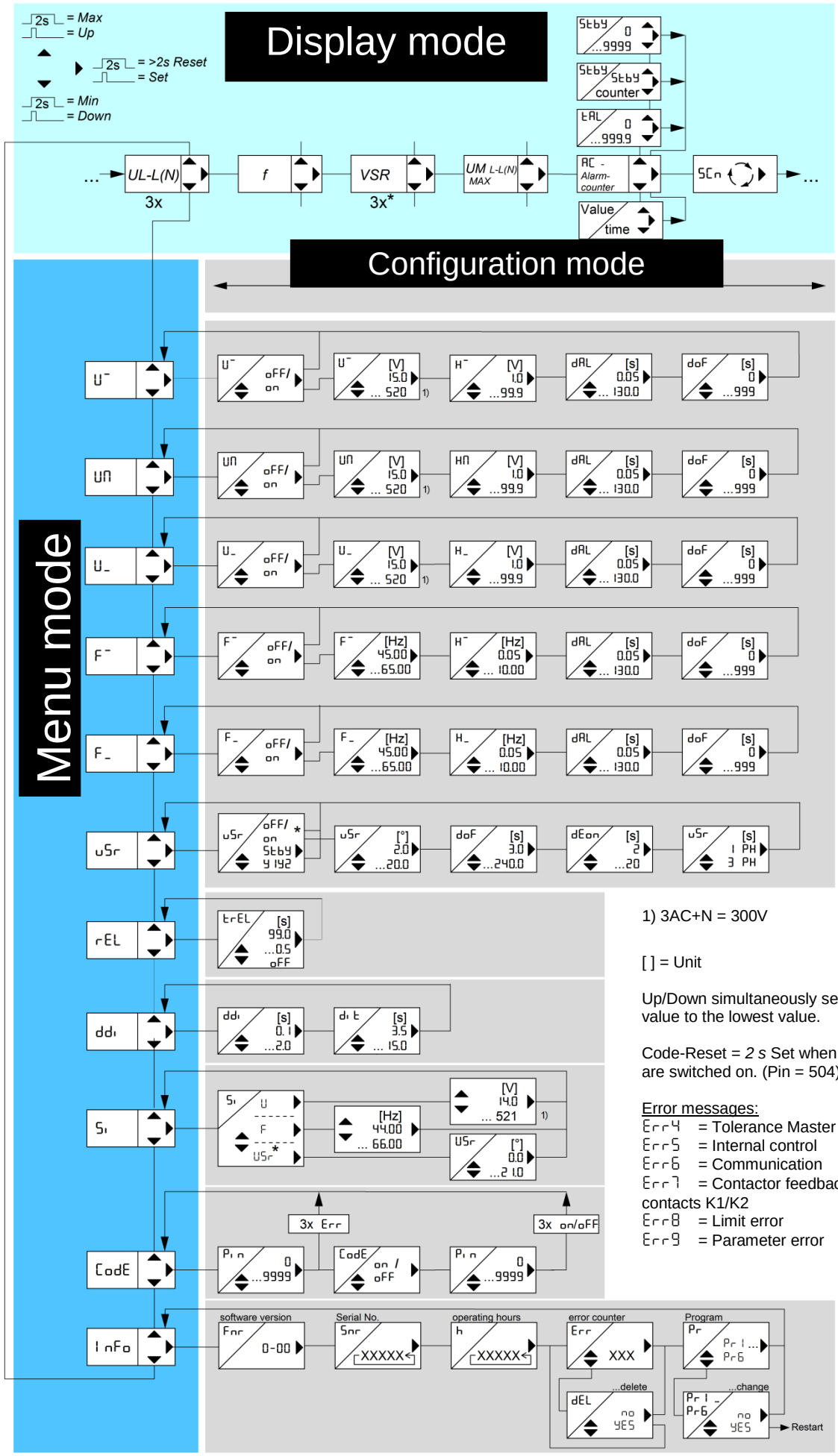
Sealing is deactivated

- Press ▲ button 1x → display `InFo.`
- Press ▶ button 5x → display `Pr 1.`
- Set the program with the buttons ▲▼
- Press ▶ button 1x → display `no.`
- Press ▼ button 1x → display `YES.`
- Press ▶ button
  ⇒ Device resets and starts with the newly selected program

Hint: When changing programs, all parameters of the selected program are reset to “default settings“ (see table „Default settings“). **Only change the parameters after having selected the correct program.**

8.2 Control chart

Pr 1 **3AC with N, acc. VDE-AR-N 4105** **Pr 2** **3AC without N, acc. VDE-AR-N 4105**



1) 3AC+N = 300V

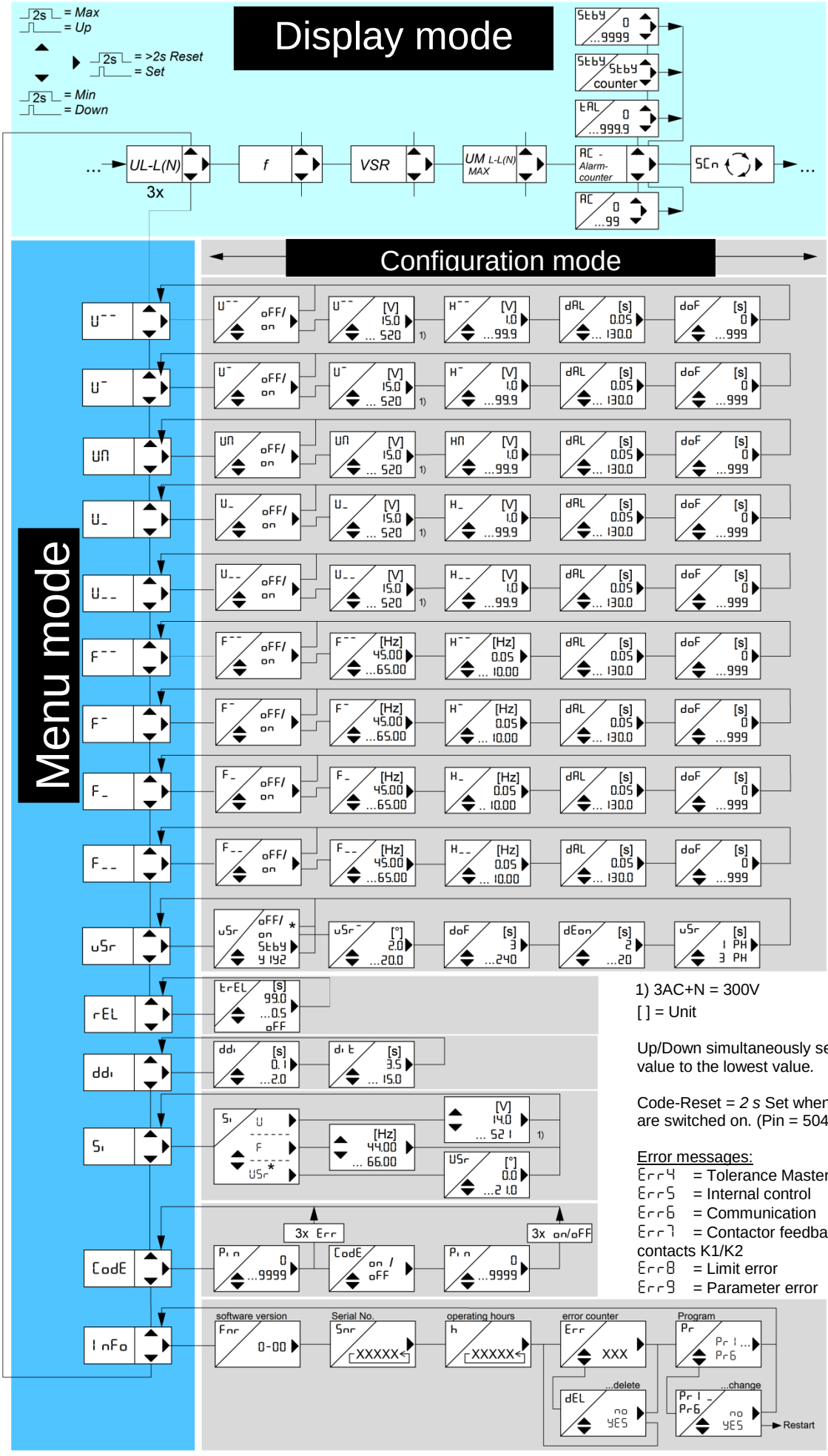
[ ] = Unit

Up/Down simultaneously sets the value to the lowest value.

Code-Reset = *2 s* Set when mains are switched on. (Pin = 504)

Error messages:

Err4 = Tolerance Master Slave
Err5 = Internal control
Err6 = Communication
Err7 = Contactor feedback contacts K1/K2
Err8 = Limit error
Err9 = Parameter error



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Error messages:
Err4 = Tolerance Master Slave
Err5 = Internal control
Err6 = Communication
Err7 = Contactor feedback contacts K1/K2
Err8 = Limit error
Err9 = Parameter error

8.3 Description of the parameters

Parameters	Display	Explanation	Adjustment range
Limit value	U U U U UN	Voltage limit value	15.0 … 300 15.0 … 520
Limit value	F , F , F , F	Frequency limit value	45.00 … 65.00
Hysteresis	H	253V (Limit) – 3V (Hysteresis) = 250V (Reset value) If the limit value is offset in Pr1 or Pr2 at F , the hysteresis also has to be adapted so that the reset point lies at 50.05 Hz again.	1.0 … 99.0 0.05 … 10.00
Response time (delay Alarm)	dAL	An alarm is suppressed for the set time (seconds)	0.05 … 130.0
Turn-on time (delay Off)	doF	Reset is delayed for the set time, also during voltage recovery, this time (seconds) is always counted down in the display	0 … 999
Enable time (delay On)	dEon	There is no evaluation of the vector shift during this time; starts with the application of the control voltage and when opening the Enable input	2 … 20
VSR	uSr	1 Ph : a vector surge on one phase leads to an alarm 3 Ph : a vector surge on all phases simultaneously leads to an alarm	1 Ph … 3 Ph
delay Display	ddi	Interval during which the display is updated in the display mode,	0.1 … 2.0

8.4 Display mode (last decimal point off)

In the display mode, the UFR1001E is in its normal state; here, depending on the program, the actual voltage, the highest actual 10 minute mean value, the frequency or the vector surge is displayed. In addition, the alarm signals (e.g. AL , AL 1) and error codes (e.g. Err9) are displayed.

Function button Set / Reset	Press briefly: Switches the measurement, alarm counter
	Press for > 2 s: Resets after locked alarm (not possible if doF Reset delay is counting down)
	Press for > 4 s: Displays the program, e.g. Pr 1
	Press for > 10 s: Displays the software version, e.g. 0-03
Function key Up / Down	Press briefly: Change into the menu mode, Display alarm counter: Down = Query the memory Up = Query the cumulative alarm time
	Press for ≥ 2 s: Displays MAX and MIN measurements, additionally pressing the Set key for ≥ 2 s deletes the saved values

8.5 Menu mode (last decimal point on)

The menu mode is used to select the menu items. If no key is pressed for 30 s, one automatically returns to the display mode.

Function button Set / Reset	Press briefly: Change into the configuration mode
	Press for ≥ 2 s: Returns to the display mode (the most recently set values are then applied)
Function key Up / Down	Press briefly: Select menu item; changes into the display mode

8.6 Configuration mode (last decimal point flashes)

In the configuration mode you can set the value of a parameter. The display alternates between the parameter relation and the currently set value until one of the Up/Down buttons is pressed, which changes the value of the parameter. If no key is pressed for 2 s the display starts alternating again.
If no key is pressed for 30 s (simulation mode 15 min) one automatically returns to the display mode (the most recently set value is applied during this)

Function button Set / Reset	Press briefly: The settings are taken over; continue to next parameter. Changes into menu mode after the last parameter
	Press for ≥ 2 s: Returns to the display mode (the most recently set values are then applied)
Function key Up / Down	Press briefly/long: Value change of the parameter (slow/fast)

Hint: Simultaneously pressing the Up and Down keys resets the adjustable value to zero. If the Up or Down button is kept pressed while setting the value the change in the display is accelerated.

8.7 Test mode (only activated and connected feedback contacts)

If feedback contacts of the section switch are connected to the UFR1001E and activated (value > set turn-on time of section switch, e.g. 5.0s), the trip circuit can be tested by pressing the Test button. To do that, the measurement voltage has to be connected and no alarm is allowed to be present!
After pressing the Test button the UFR1001E triggers. The tripping time of the internal relay + section switch are measured through the feedback contacts. After successful tripping, the tripping time of the slower switch remains shown in the display until any key is pressed.

8.8 Alarm counter

The alarm counter Ac is increased by 1 with every shut-down. Up to 100 shut-downs are counted. That allows quick detection of how often the UFR1001E has shut down since the last delete of the alarm counter (see cumulative alarm time).
Query the alarm counter:

- Change into the display mode
- Press the ▶ button several times until → display Acxx

8.9 Cumulative alarm time (display in hours)

The cumulative alarm time tAL indicates how long the relay was switched off due to an alarm. It is recorded with a resolution of 1 minute and only when the control voltage is applied.
Query the cumulative alarm time:

- Change into the display mode
- Press the ▶ button several times until → display Acxx
- Press the ▲ button 1x → display tAL / xxx

Delete the alarm counter and cumulative alarm time (only together):

- Display alarm counter Acxx
- Press the ▲ button 1x → display tAL / xxx
- Keep the ▶ button pressed for 2s until → display tAL / 0.00

8.10 Alarm memory

Independent of the alarm counter, the UFR1001E stores the most recent 100 shut-down causes (cause, measurement value, at operating time). Simulated alarms are also registered. The LEDs indicate the cause; the tripping value that led to the alarm each stands in the 7-segment display. Alternative to that the time is shown in hours which have passed since the last tripping (with applied control voltage). These values remain saved even after the power has been turned off.

Query alarm memory:

- Change into the display mode
- Press the ▶ button several times → display AcXX
- Press the ▼ button 1x → display xxx / xxx (tripping value or error no. / time that has passed in hours)
- Press the ▼ button 1x, go to next alarm

The alarm memory is only deleted during a program change.

8.11 Standby counter and standby time

The standby counter StbY, is increased by 1 with every standby shut-down. Up to 9999 shut-downs are counted. That lets the UFR1001E quickly detect how often, e.g., shut-down was performed through a ripple control receiver.

Query the standby counter:

- Change into the display mode
- Press the ▶ button several times until → display AcXX
- Press the ▲ button 2x → display StbY / xxxx

The standby time StbY indicates how long the relay was switched off by the standby mode. It is recorded with a resolution of 1 minute and only when the control voltage is applied and if no alarm is present.

Query the standby time:

- Change into the display mode
- Press the ▶ button several times until → display AcXX
- Press the ▲ button 3x → display StbY / xxx (Time LED is illuminated)

Delete the standby counter and standby time (only together):

- Display alarm counter AcXX
- Press the ▲ button 2x → display StbY / xxxx
- Keep the ▶ button pressed for 2s until → display StbY / 0

8.12 Code lock

You can protect the set parameters by enabling the code lock here.
The device acknowledges an incorrect entry with Err (flashes three times).

Adjustment process:

- Select the menu item with the ▲▼ buttons until → display CodE.
- Press the ▶ button 1x → display Pin / 0
- Set the **saved** pin code with the ▲▼ buttons (**default setting is** 504)
- Press the ▶ button 1x → display CodE / oFF
- Use the ▲▼ buttons to set the desired code lock:
  - oFF off, all parameters can be changed
  - on on, no parameters can be changed
- Press the ▶ button 1x → display Pin / 504
- Use the ▲▼ buttons to set the new, desired pin code (**caution: write down the pin code**)
- Press the ▶ button 1x

⇒ Code lock on, display on flashes three times
⇒ Code lock off, display oFF flashes three times

⇒ Return to menu mode, menu item code lock

If there are any problems with the code lock (pin forgotten), the lock can be switched off and the pin can be reset to 504 by keeping the Set key pressed while switching on the mains until ▶ CodE / oFF appears in the display.

8.13 Sealing

All the settings and the simulation mode can be locked.

If the LED is illuminated, the UFR1001E is locked.
If an attempt is made to change a setting in the locked state, for 3s the display shows Loc.

Adjustment procedure Sealing/Lock ON (OFF):

- If present, remove seal (only authorised person)
- Apply control supply voltage at A1-A2
- Slightly lift the key cover and turn 180°
- Actuate the small blue button by pressing the button cover very firmly (LED starts flashing) until the green LED is illuminated.

8.14 Simulation

Here, the voltage, frequency or a vector surge can be simulated and the setting can be tested. All 3 phases plus the 10 minute mean value are always simulated. All functions of the device operate as if this value is actually being measured. Alarm and error messages are only indicated with the LEDs and not in the display. The set values are simulated until the menu item SI . is exited with the ▲ or ▼ button. If the UFR1001E is sealed/locked, simulation is not possible.
If the section switch feedback contacts are connected to the UFR1001E and enabled, (set value > section-switch turn-on time under trEL.), after a shut-down, the tripping time (dAL + time of slowest section switch) is displayed.

Adjustment process:

- Select the menu item with the ▲▼ buttons until → display SI .
- Press the ▶ button 1x → display SI / U
- Use the ▲▼ buttons to set the measurement factor for simulation:
  - U Voltage + 10min mean value (frequency = last simulated value)
  - F Frequency (voltage = last simulated value)
  - uSr Vector shift
- Press the ▶ button 1x → display 230 (selected measurement factor is simulated)
- Use the ▲▼ buttons to set the desired value

After exiting the Simulation menu item with the ▲▼ buttons, the unit switches over to monitoring the limits. The unit automatically returns to the display mode if no button is pressed for 15 minutes.

Hint: A limit value should be tested that is higher than the set 10min mean value. If the 10min mean value has to be temporarily switched off, set (UN . → oFF. since otherwise it will trip first. The same applies, for example, for U⁻ , during a simulation of U⁻⁻ in Pr3 and Pr4. (Medium voltage)

8.15 Possible indications in display

Display mode

AL , AM	Alarm , Alarm 10min mean value
Err4 ... Err9	Error messages (see 11. Error messages and measures)
Ac , tAL	Alarm counter, cumulative alarm time
Scn , M	Scan mode, 10min mean value

Menu mode / configuration mode

U-- , U- , U__ , U_	Voltage limit value
UM	Limit value 10min mean value
H-- , H- , H__ , H_ , HM	Hysteresis (if a limit value is changed, the reset value also shifts; that means it might be necessary to adapt it)
F-- , F- , F__ , F_	Frequency limit value
dAL	Response time
doF	Reset time; is always counted down in the display
uSr	Vector surge
Stby	Standby mode, standby-time, standby-counter
y192	Evaluation of the feedback contacts is suppressed when E1-E2 are closed
dEon	Delay Enable On, suppression time when switching on and after opening the enable input
1 Ph , 3 Ph	Single phase, three-phase vector shift evaluation
rEL	Relay
trEL	Section switch turn-on time, oFF no feedback contacts
ddi	Delay display, to calm down the display
di t	Display duration scan mode (each measurement is displayed for this duration)
Si	Simulation
F , U	Frequency, voltage
CodE , PLo , uSr	Code lock / sealing, vector shift
Pin	Pin code (default 504)
InFo	Device information, program change
Fnr , Snr	Firmware version, serial number
h	Operating hours
Err , dEL	Error counter, delete error counter
YES , no	Yes, no query for acknowledgement
Pr	Program
on , oFF	On, Off

9. Default settings and firmware version

When changing programs, all parameters are reset to the default settings.

Menu item	Parameter / Unit		Default settings						Users data
			Low voltage		Medium voltage				
			3AC+N 230V	3AC 400V	3AC+N 57.7V	3AC 100 V	3AC+N 230V	3AC 400V	
			Pr 1 *	Pr2	Pr3	Pr4	Pr5	Pr6	
U--	U-- Alarm on/off		-	-	on	on	on	on	
	U-- **Overvoltage**	V	-	-	66.4	115	264	458	
	H-- Hysteresis	V	-	-	1.0	1.0	3.0	3.0	
	dAL Response time	s	-	-	0.10	0.10	0.10	0.10	
	doF OFF-delay	s	-	-	60	60	60	60	
U-	U- Alarm on/off		on	on	on	on	on	on	
	U- **Overvoltage**	V	264	458	62.3	108	249	430	
	H- Hysteresis	V	5.0	5.0	1.0	1.0	3.0	3.0	
	dAL Response time	s	0.10	0.10	60.00	60.00	60.00	60.00	
	doF OFF-delay	s	60	60	60	60	60	60	
UN	UN Alarm on/off		on	on	oFF	oFF	oFF	oFF	
	UN **Overvoltage**	V	253	438	253	438	253	438	
	HN Hysteresis	V	3.0	3.0	3.0	3.0	3.0	3.0	
	dAL Response time	s	0.10	0.10	0.10	0.10	0.10	0.10	
	doF OFF-delay	s	60	60	60	60	60	60	
U_	U_ Alarm on/off		on	on	on	on	on	on	
	U_ **Undervoltage**	V	184	318	46.2	80.0	184	318	
	H_ Hysteresis	V	5.0	5.0	1.0	1.0	3.0	3.0	
	dAL Response time	s	0.10	0.10	2.70	2.70	2.70	2.70	
	doF OFF-delay	s	60	60	60	60	60	60	
U__	U__ Alarm on/off		-	-	oFF	oFF	oFF	oFF	
	U__ **Undervoltage**	V	-	-	26.0	45.0	104	180	
	H__ Hysteresis	V	-	-	1.0	1.0	2.0	2.0	
	dAL Response time	s	-	-	0.30	0.30	0.30	0.30	
	doF OFF-delay	s	-	-	60	60	60	60	
F--	F-- Alarm on/off		-	-	oFF	oFF	oFF	oFF	
	F-- **Overfrequency**	Hz	-	-	51.50	51.50	51.50	51.50	
	H-- Hysteresis	Hz	-	-	1.45	1.45	1.45	1.45	
	dAL Response time	s	-	-	0.10	0.10	0.10	0.10	
	doF OFF-delay	s	-	-	60	60	60	60	
F-	F- Alarm on/off		on	on	on	on	on	on	
	F- **Overfrequency**	Hz	51.50	51.50	51.50	51.50	51.50	51.50	
	H- Hysteresis	Hz	1.45	1.45	1.45	1.45	1.45	1.45	
	dAL Response time	s	0.10	0.10	0.10	0.10	0.10	0.10	
	doF OFF-delay	s	60	60	60	60	60	60	

Menu item	Parameter / Unit		Default settings						Users data
			Low voltage		Medium voltage				
			3AC+N 230V	3AC 400V	3AC+N 57.7V	3AC 100 V	3AC+ N 230V	3AC 400V	
			Pr 1 *	Pr2	Pr3	Pr4	Pr5	Pr6	
F_	F_ Alarm on/off		on	on	on	on	on	on	
	F_ **Underfrequency**	Hz	47.50	47.50	47.50	47.50	47.50	47.50	
	H_ Hysteresis	Hz	1.00	1.00	1.00	1.00	1.00	1.00	
	dAL Response time	s	0. 10	0. 10	0. 10	0. 10	0. 10	0. 10	
	doF OFF-delay	s	60	60	60	60	60	60	
F__	F__ Alarm on/off		-	-	oFF	oFF	oFF	oFF	
	F__ **Underfrequency**	Hz	-	-	47.50	47.50	47.50	47.50	
	H__ Hysteresis	Hz	-	-	1.00	1.00	1.00	1.00	
	dAL Response time	s	-	-	0. 10	0. 10	0. 10	0. 10	
	doF OFF-delay	s	-	-	60	60	60	60	
uSr	uSr Alarm on/off		StbY	StbY	StbY	StbY	StbY	StbY	
	uSr **Vector shift**	°	10.0	10.0	10.0	10.0	10.0	10.0	
	doF OFF-delay	s	3	3	3	3	3	3	
	dEon Suppression time	s	2	2	3	3	3	3	
	uSr Number of phases		3Ph	3Ph	3Ph	3Ph	3Ph	3Ph	
rEL	trEL Response time X1-X2	s	5.0	5.0	oFF	oFF	oFF	oFF	
ddi	ddi Display delay	s	0.5	0.5	0.5	0.5	0.5	0.5	
	di t Display duration SCn	s	3.5	3.5	3.5	3.5	3.5	3.5	
Si	U Voltage	V	230	400	57.7	100	230	400	
	F Frequency	Hz	50.00	50.00	50.00	50.00	50.00	50.00	
	uSr Vector shift	°	0.0	0.0	0.0	0.0	0.0	0.0	
CodE	Pin Pincode		504	504	504	504	504	504	
InFo	Fnr Firmware version		0-03	0-03	0-03	0-03	0-03	0-03	
	Snr Serial number		xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	
	h Operating hours	h	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	
	Err Error counter		xxx	xxx	xxx	xxx	xxx	xxx	
	Pr Program		1	2	3	4	5	6	

* default setting

Display of the program: InFo → Pr or when switching on

Display of the firmware version: InFo → Fnr

10. Technical Data

Control voltage Us:	
Rated connection	AC/DC 24-270 V, 0/40...70 Hz, < 5 VA DC: 20.4...297 V, AC: 20.4...297 V
Output relay:	2 x change-over contact
Switching voltage	Max. AC 440 V
Conventional thermal current Ith	6 A
Inrush current (at 10 % ED)	25 A max. 4 s / 50 A max. 1 s
Nominal operating current Ie (AC 15)	6 A AC 250 V
Recommended series fuse	gG/gL 6 A
Contact service life, mech.	30 x 10^6 switching cycles
Contact service life, electr.	1 x 10^6 operating cycles at AC 250 V / 6 A 2 x 10^5 operating cycles at AC 250 V / 10 A cos φ 0.6
Voltage measurement:	
Measurement voltage phase – phase	AC 15…530 V (< 5 V: 0 is displayed)
Adjustment range phase – phase	AC 15…520 V
Measurement voltage phase – N	AC 10…310 V (< 5 V: 0 is displayed)
Adjustment range phase – N	AC 15…300 V
Measurement principle	Real root mean square measurement both half waves
Hysteresis	Adjustable 1.0…99.9 V
Measurement error (with N)	± 0.6 % of the measurement value
Measurement error (without N)	± 0.8 % of the measurement value
Display accuracy	>100V: -1 digit (res. 1 V) <100V: -1 digit (res. 0.1V)
Measurement function	3-phase with/without N
Response time	Adjustable 0.05 (±15ms)…130.0 s
Reset time	Adjustable 0(>200ms) … 999 s
Frequency measurement	
Frequency range	40…70 Hz
Adjustment range	45.00…65.00 Hz
Hysteresis	0.05…10.00 Hz
Measurement accuracy	± 0.04Hz ± 1 digit
Response time	Adjustable 0.05 (±15ms)…130.0 s
Reset time	Adjustable 0 (>200ms) … 999 s
Vector surge	
Measurement range	0…45.0°
Adjustment range	2.0…20.0°
Response time	< 50 ms
Reset time	Adjustable 3…240 s
Delay at Us on	Adjustable 2…20 s
Digital outputs (galvanic isolated)	
Switching voltage I1	DC 4.5…27 V
Current Q1…Q5	Max 20 mA / output
Contactor feedback inputs	
Voltage Y0 – Y1/2	DC 15…35 V
Contactor response time (section switch)	Adjustable 0.5...99.0 s

Test conditions	EN 60255
Rated impulse withstand voltage	4000 V
Surge category III	
Pollution level 2	
Rated insulation voltage Ui	300 V
Insulation group	II
Operating time	100 %
Permissible ambient temperature -20 °C... +55 °C	
	EN 60 068-2-1 dry heat
EMC - noise immunity	EN 61000-6-2
EMC - noise emission	EN 61000-6-3

Housing:	
Construction form	V6
Front-to-back size	55 mm
Dimensions (W x H x D)	90 x 105 x 69 mm
Wiring connection single strand	each 1 x 4mm^2
Finely stranded with wire end ferrule	each 1 x 2.5mm^2
Protection class, housing	IP 30
Protection class, terminals	IP 20
	Mounting snap-on fastening on 35 mm mounting rail acc EN 60 715 or with M4 screwed attachment (additional bar not included in the scope of delivery)
Weight:	approx. 250 g

We reserve the right to make technical changes

11. Maintenance and repair

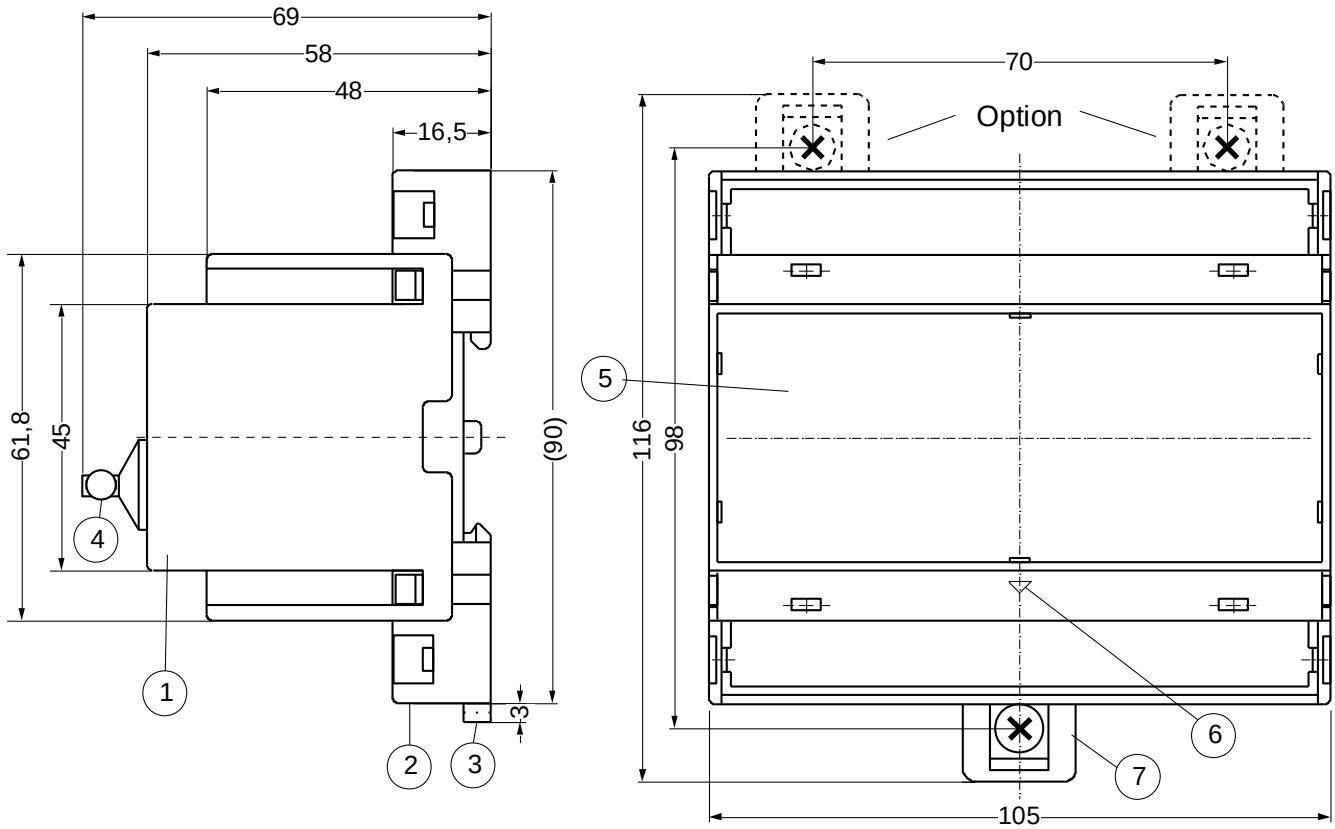
The UFR1001E is maintenance-free. Periodically test for proper functioning.

12. Troubleshooting and measures

Error	Cause	Remedy
EEEE or -EEE appears in the display	Measurement is above/below range	Measured voltage, frequency or the vector surge is too large or too small; comply with measurement range
Err4 appears in the display	Tolerance error	Internal measurement value deviation of both channels, do a reset → interrupt control voltage for >5s
Err5 appears in the display	Error internal interface	Reset → interrupt control voltage for >5s
Err6 appears in the display	Communication error, internal interface	Reset → interrupt control voltage for >5s
Err7 also appears in the display after 2 automatic reconnection attempts, LED K1 and / or K2 illuminated	Feedback contacts connected	Feedback contacts not connected Set - rEL . → trEL. → oFF Feedback contacts not connected - Check for correct connection - Set turn-on time of section switch under trEL. - Do a reset → interrupt control voltage for >5s
Err8 appears in the display	Hysteresis error	Upper threshold value must be higher than the lower threshold value, check the threshold values
Err9 appears in the display	Parameter error	Reset to factory settings, see “Program setup”
A time expires in the display	Always when an OFF-delay time doF is running, it is counted down in the display (shortest one first)	Wait until the time has expired (depending on the setting, several times may elapse one after the other)
Device cannot be configured / only the limits can be configured	Code lock / Sealing activated	If there are any problems with the code lock (pin forgotten), the lock can be switched off and the pin can be reset to 504 by keeping the Set key pressed while switching on the mains until ▶ CodE / oFF appears in the display.
Implausible voltage values	Pr selected with N, but N not connected	Select Pr without N or connect N
Loc appears in the display	Seal is active	See Sealing
CodE appears in the display	Code lock is active	See „Code lock“
Stby appears in the display	Standby mode, E1-E2 closed	Check parameter uSr.

13. Construction form V6

Dimensions in mm



1	Oberteil / cover
2	Unterteil / base
3	Riegel / bar for snap mounting
4	Sealing max. Ø 1.8 mm
5	Frontplatteneinsatz / front panel
6	Kennzeichen für unten / position downward
7	Bar for wall attachment with screws. Riegelbohrung Ø 4,2 mm / Bolt hole for fixing to wall with screws, Ø 4.2 mm.

14. Verification of conformity

Bureau Veritas
Consumer Products Services
Germany GmbH
Businesspark A96
86842 Türkheim
Deutschland
+ 49 (0) 4074041-0
cps-tuerkheim@de.bureauveritas.com

Zertifizierungsstelle der BV CPS GmbH
Akkreditiert nach EN 45011 -
ISO / IEC 17011

Konformitätsnachweis NA-Schutz

Hersteller / Antragsteller: **ZIEHL industrie-elektronik GmbH + CO KG**
Daimlerstr.13
74523 Schwäbisch Hall
Deutschland

Typ NA-Schutz:	**Zentraler NA-Schutz**	**UFR1001E**

Firmwareversion **0-0x**

Netzanschlussregel: **VDE-AR-N 4105:2011-08 – Erzeugungsanlagen am Niederspannungsnetz**
Technische Mindestanforderungen für Anschluss und Parallelbetrieb von Erzeugungsanlagen am Niederspannungsnetz

Mitgeltende Normen / Richtlinien: **E DIN V VDE V 0124-100 (VDE V 0124-100):((2011-11)) – Netzintegration von Erzeugungsanlagen – Niederspannung**
Prüfanforderungen an Erzeugungseinheiten vorgesehen zum Anschluss und Parallelbetrieb am Niederspannungsnetz

Der oben bezeichnete NA-Schutz wurde nach der Prüfrichtlinie VDE 0124-100 geprüft und zertifiziert. Die in der Netzanschlussregel geforderten elektrischen Eigenschaften werden erfüllt:

- Einstellwerte und die Abschaltzeiten
- Technische Anforderungen der Schalteinrichtung
- Passive Inselnetzerkennung
- Einfehlersicherheit

Das Zertifikat beinhaltet folgende Angaben:

- Technische Daten des NA-Schutz
- Einstellwerte der Schutzfunktionen
- Auslösewerte der Schutzfunktionen

BV Projektnummer: **11TH0501**

Zertifikatsnummer: **U12-0109**

Ausstellungsdatum: **2012-02-02** **Gültig bis:** **2015-02-01**

Zertifizierungsstelle

Dieter Zitzmann

(Eine auszugsweise Darstellung des Zertifikats bedarf der schriftlichen Genehmigung der BV CPS GmbH)

DAkkS Deutsche Akkreditierungsstelle
D-ZE-12024-01-01

F.4 Anforderungen an den Prüfbericht zum NA-Schutz

Auszug aus dem Prüfbericht für den NA-Schutz **Nr. 11TH0501**
„Bestimmung der elektrischen Eigenschaften“

NA-Schutz als zentraler NA-Schutz

Hersteller / Antragsteller:	**ZIEHL industrie-elektronik GmbH + CO KG** **Daimlerstr.13** **74523 Schwäbisch Hall** **Deutschland**	
Typ NA-Schutz:	**Zentraler NA-Schutz**	**UFR1001E**
Firmwareversion:	**0-0x***	

* Die Prüfungen wurden mit Firmwareversion 0-00 durchgeführt. Die Änderungen der Firmwareversion auf 0-0x hat keinen Einfluss auf die in der Netzanschlussregel geforderten elektrischen Eigenschaften.
x= beliebige Zahl oder Zeichen

Messzeitraum:	**2012-01-26 – 2012-02-02**

Schutzfunktion	Einstellwert	Auslösewert	Auslösezeit NA-Schutz[a]
Spannungsrückgangsschutz U <	**184 V**	**183,9 V**	**98 ms**
Spannungssteigerungsschutz U>	**253 V**	**---**	**536 s[b]**
Spannungssteigerungsschutz U>>	**264 V**	**263,8 V**	**98 ms**
Frequenzrückgangsschutz f<	**47,50 Hz**	**47,51 Hz**	**80 ms**
Frequenzsteigerungsschutz f>	**51,50 Hz**	**51,51 Hz**	**93 ms**

[a] Die Auslösezeit umfasst den Zeitraum von der Grenzwertverletzung U/f bis zum Auslösesignal an dem Kuppelschalter.

[b] längste Abschaltung des Spannungssteigerungsschutz als gleitender 10-min-Mittelwert

Bei der Planung der Erzeugungsanlage ist die Eigenzeit des Kuppelschalters zum höchsten oben ermittelten Zeitwert zu addieren.

Die Abschaltzeit (Summe der Auslösezeit NA-Schutz zzgl. Eigenzeit des Kuppelschalters) darf 200 ms nicht überschreiten.

Der oben genannte NA-Schutz erfüllt die Anforderungen zur Synchronisation.

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Zertifizierungsstelle der BV CPS GmbH
Akkreditiert nach EN 45011 -
ISO / IEC Guide 65

Prüfbescheinigung

Hersteller / Antragsteller: **ZIEHL industrie-elektronik GmbH + CO KG**
Daimlerstr.13
74523 Schwäbisch Hall
Deutschland

Typ NA-Schutz:	**Zentraler NA-Schutz**	**UFR1001E**

Firmwareversion
(Erläuterung siehe Anhang) **0-0x**

Netzanschlussregel: **BDEW-Richtlinie „Erzeugungsanlagen am Mittelspannungsnetz“**
Richtlinie für Anschluss und Parallelbetrieb von Erzeugungsanlagen am Mittelspannungsnetz, 2008 und Ergänzung 1/2009, 7/2010 und 2/2011

Mitgeltende Normen / Richtlinien: DIN EN 61400-21:2008;
Technische Richtlinien: TR3 Rev. 22, TR8 Rev. 5

Die oben bezeichnete Erzeugungseinheit wurde nach folgenden Kapiteln, der in der Netzanschlussregel referenzierten technischen Richtlinien, geprüft:

- Einstellwerte und Abschaltzeiten (Kapitel 4.5 in TR3 und 5.1.9 in TR8)
- Rückfallverhältnis (Kapitel 4.5 in TR3 und 5.1.9 in TR8)
- Wiederzuschaltbedingungen (Kapitel 4.6 in TR3 und 5.1.6 in TR8)

Das Zertifikat beinhaltet folgenden Anhang:

- Auslösewerte der Schutzfunktionen
- Einstellwerte der Schutzfunktionen

BV Berichtsnummer: **11TH0501_TR3**

Zertifikatsnummer: **12-095**

Ausstellungsdatum: **2012-05-02**

Zertifizierungsstelle

Dieter Zitzmann

(Eine auszugsweise Darstellung des Zertifikats bedarf der schriftlichen Genehmigung der BV CPS GmbH)

DAkkS Deutsche Akkreditierungsstelle
D-ZE-12024-01-01

Auszug aus dem Prüfbericht (11TH0501_TR3)	
Firmware des NA-Schutzes	
Geprüfte Version	0-01
Zugelassene Version	0-0x mit x = 1 und höher

TR 3 – 4.5 Trennung der EZE vom Netz

	Einstellwert	Auslösewert	Einstellwert [ms]	Abschaltzeit [ms]
Frequenzrückgangsschutz	47,50 Hz	47,51 Hz	100	101,3 ... 104,3
Frequenzrückgangsschutz (schnellstmöglich)	47,50 Hz	47,51 Hz	0,05	51,1 ... 53,1
Frequenzsteigerungsschutz	51,50 Hz	51,50 Hz	100	101,4 ... 101,9
Spannungsrückgangsschutz (1. Stufe)	184,0 V	184,1 V	2400	2379,9 ... 2399,0
Spannungsrückgangsschutz (schnellstmöglich)	184,0 V	184,1 V	0,05	49,1 ... 49,5
Spannungsrückgangsschutz (2. Stufe)	104,0 V	105,1 V	300	297,6 ... 309,0
Spannungssteigerungsschutz	276,0 V	275,7 V	100	97,9 ... 101,1

Einstellbare Parameter (*Herstellerangabe*)

Unterfrequenzschwelle-Parametername	F_
Unterfrequenzschwelle-Parameterdimension	Hz
Unterfrequenzschwelle-Parameterbereich	45,00 – 65,00
Unterfrequenzschwelle-Parameterschrittweite	0,01
Unterfrequenzverzögerungszeit-Parametername	dAl
Unterfrequenzverzögerungszeit-Parameterdimension	s
Unterfrequenzverzögerungszeit-Parameterbereich	0,05 – 60,00
Unterfrequenzverzögerungszeit-Parameterschrittweite	0,01
Überfrequenzschwelle-Parametername	F‾
Überfrequenzschwelle-Parameterdimension	Hz
Überfrequenzschwelle-Parameterbereich	45,00 – 65,00
Überfrequenzschwelle-Parameterschrittweite	0,01
Überfrequenzverzögerungszeit-Parametername	dAl
Überfrequenzverzögerungszeit-Parameterdimension	s
Überfrequenzverzögerungszeit-Parameterbereich	0,05 – 60,00
Überfrequenzverzögerungszeit-Parameterschrittweite	0,01
1. Unterspannungsschwelle-Parametername	U_
1. Unterspannungsschwelle-Parameterdimension	V
1. Unterspannungsschwelle-Parameterbereich	15,0 – 300,0
1. Unterspannungsschwelle-Parameterschrittweite	range 15,0 - 99,9: 0,1 / range 100 – 300: 1
1. Unterspannungsverzögerungszeit-Parametername	dAl
1. Unterspannungsverzögerungszeit-Parameterdimension	s
1. Unterspannungsverzögerungszeit-Parameterbereich	0,05 – 60,00
1. Unterspannungsverzögerungszeit-Parameterschrittweite	0,01
2. Unterspannungsschwelle-Parametername	U__

Auszug aus dem Prüfbericht (11TH0501_TR3)	
2. Unterspannungsschwelle-Parameterdimension	V
2. Unterspannungsschwelle-Parameterbereich	15,0 – 300,0
2. Unterspannungsschwelle-Parameterschrittweite	range 15,0 - 99,9: 0,1 / range 100 – 300: 1
2. Unterspannungsverzögerungszeit-Parametername	dAl
2. Unterspannungsverzögerungszeit-Parameterdimension	s
2. Unterspannungsverzögerungszeit-Parameterbereich	0,05 – 60,00
2. Unterspannungsverzögerungszeit-Parameterschrittweite	0,01
Überspannungsschwelle-Parametername	$\overline{U}$
Überspannungsschwelle-Parameterdimension	V
Überspannungsschwelle-Parameterbereich	15,0 – 300,0
Überspannungsschwelle-Parameterschrittweite	range 15,0 - 99,9: 0,1 / range 100 – 300: 1
Überspannungsverzögerungszeit-Parametername	dAl
Überspannungsverzögerungszeit-Parameterdimension	s
Überspannungsverzögerungszeit-Parameterbereich	0,05 – 60,0
Überspannungsverzögerungszeit-Parameterschrittweite	0,01
Anmerkung: Die angegebenen Abschaltzeiten beinhalten die Einstellzeit und die Eigenzeit der Schutz- und Schalteinrichtung des NA-Schutzes. Das Rückfallverhältnis wird eingehalten.	

Auszug aus dem Prüfbericht (11TH0501_TR3)		
TR 3 – 4.6 Zuschaltbedingungen		
	Einstellwert	Zuschaltung bei
Unterspannung [V]	184,0 + Hysterese 34,5 → 218,5	218,5
Unterfrequenz [Hz]	47,50 + Hysterese 0,05 → 47,55	47,56
Überfrequenz [Hz]	51,5 + Hysterese 1,45 → 50,05	50,05
Einstellbare Parameter (*Herstellerangabe*)		
Unterspannungsschwelle-Parametername		U_
Unterspannungsschwelle/-hysterese-Parameterdimension		V
Unterspannungsschwelle-Parameterbereich		15,0 – 300,0
Unterspannungsschwelle-Parameterschrittweite		range 15,0 - 99,9: 0,1 / range 100 – 300: 1
Unterspannungsschwelle-Parameter getestet		184,0
Unterspannungshysterese-Parametername		H_
Unterspannungshysterese-Parameterbereich		1,0 – 99,9
Unterspannungshysterese-Parameterschrittweite		0,1
Unterspannungshysterese-Parameter getestet		34,5
Unterfrequenzschwelle-Parametername		F_
Unterfrequenzschwelle/-hysterese-Parameterdimension		Hz
Unterfrequenzschwelle-Parameterbereich		45,00 – 65,00
Unterfrequenzschwelle-Parameterschrittweite		0,01
Unterfrequenzschwelle-Parameter getestet		47,50
Unterfrequenzhysterese-Parametername		H_
Unterfrequenzhysterese-Parameterbereich		0,05 – 10,0
Unterfrequenzhysterese-Parameterschrittweite		0,05
Unterfrequenzhysterese-Parameter getestet		0,05
Überfrequenzschwelle-Parametername		F‾
Überfrequenzschwelle/-hysterese-Parameterdimension		Hz
Überfrequenzschwelle-Parameterbereich		45,00 – 65,00
Überfrequenzschwelle-Parameterschrittweite		0,01
Überfrequenzschwelle-Parameter getestet		51,50
Überfrequenzhysterese-Parametername		H‾
Überfrequenzhysterese-Parameterbereich		0,05 – 10,0
Überfrequenzhysterese-Parameterschrittweite		0,05
Überfrequenzhysterese-Parameter getestet		1,45

15. Adjustment values table VDE-AR-N 4105

Protective function	AR 4105	ZIEHL	in * Un	in % Un	Adjustment value	Tripping time dAL	OFF-delay time doF
Voltage decrease protection	U<	U-	0.8 * Un	80 % Un	184 V	100 ms	60 s
Voltage increase protection (10-minutes mean value)	U>	Un	1.1 * Un	110% Un	253V	100 ms	60 s
Voltage increase protection	U>>	U--	1.15 * Un	115% Un	264V	100 ms	60 s
Frequency decrease protection	f<	F-			47.5Hz	100 ms	60 s
Frequency increase protection	f>	F--			51.5Hz	100 ms	60

16. Adjustment values table BDEW June 2008, acc 3.2.3.3-1

Function	Adjustment range of the protective relay	Default settings	
Voltage increase protection U>>	1.00 – 1.30 U_n	1.15 U_n	100 ms
Voltage increase protection U>	1.00 – 1.30 U_n	1.08 U_n	60 s
Voltage decrease protection U<	0.15 – 1.00 U_n	0.80 U_n	2.7 s
Voltage decrease protection U<< *	0.15 – 1.00 U_n	0.45 U_n	300 ms
Frequency increase protection *f*>	50.0 – 65.0 Hz	51.5Hz	100 ms
Frequency decrease protection *f*<	45.0 – 50.0 Hz	47.5Hz	100 ms
* Not enabled in as delivered condition			